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ASSESSING THE IMPACT OF COMPUTER-BASED SIMULATIONS ON THE  
INTERPROFESSIONAL EDUCATION OF UNDERGRADUATE STUDENTS

By

Heather Isaacson

THESIS

Submitted to

Northern Michigan University

In partial fulfillment of the requirements

For the degree of

EDUCATIONAL SPECIALIST

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## SIGNATURE APPROVAL FORM


### ASSESSING THE IMPACT OF COMPUTER-BASED SIMULATIONS ON THE INTERPROFESSIONAL EDUCATION OF UNDERGRADUATE STUDENTS

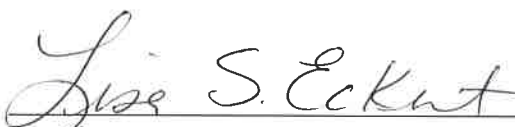
This thesis by Heather Isaacson is recommended for approval by the student's Thesis Committee and Associate Dean in the School of Education, Leadership and Public Service and by the Dean of Graduate Education and Research.

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## ABSTRACT

### ASSESSING THE IMPACT OF COMPUTER-BASED SIMULATIONS ON THE INTERPROFESSIONAL SKILLS OF UNDERGRADUATE STUDENTS

By

Heather Isaacson

Interprofessional Education (IPE) is not unique as it is a concept that has been advocated for more than 40 years by the Institute of Medicine (American Speech-Language-Hearing Association [ASHA], 2016). Interprofessional education occurs “when two or more professions learn about, from, and with each other to enable effective collaboration and improve health outcomes” (World Health Organization [WHO], 2010, p. 13). It is a staple in the education of nurses and doctors; however, it is starting to make an appearance in Communication Sciences and Disorders programs. As a result, this is a topic of great interest to faculty teaching in the area of speech-language pathology. Interprofessional education, believed to be a catalyst for successful interprofessional clinical practice, is promoted by agencies worldwide (WHO, 2010). Teaching interprofessional collaboration within preclinical training experiences may allow students real-life opportunities to identify barriers, problem-solve situations, and practice the necessary skills to work as part of an interprofessional team. The purpose of this project is to provide an interprofessional, evidence-based learning experience for students in the Speech, Language, and Hearing Sciences program. The research will focus on students’ perspective of interprofessional education and learning. The research on computer-based interactive simulations will examine how the activities are designed to ensure a high level of authenticity for interprofessional practice as well as how they are developed and evaluated for meeting students’ educational, clinical objectives and standards.

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This thesis follows the format recommended by the Manual of the American Psychological Association.

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## INTRODUCTION

Interprofessional education (IPE) has been defined as "...students from two or more professions learn[ing] about, from and with each other to enable effective collaboration and improve health outcomes" (World Health Organization [WHO], 2010, p. 13). Interprofessional education encourages health professionals to learn interactively with each other, on the premise that collaborative learning will have direct positive effects on patient health. In IPE, students in health-related fields work across disciplinary boundaries to gain experience with comprehensive patient care. This knowledge and experience allow students to enter the workplace as a member of the collaborative practice team (WHO, 2010, p. 10). Learners are central to the IPE processes. However, the interaction between the learner and the educator is an essential element of IPE (D'amour & Oandasan, 2005). Educators and mentors who act as role models further reform a student's professional identity shaped by already formed stereotypes. Few formal learning opportunities at the pre-licensure level currently exist to teach health and education professionals to be collaborative practitioners (D'amour & Oandason, 2005). Students may have limited knowledge about the roles, scopes of practice, philosophies, or even professional language used by the other disciplines, which subsequently may lead to significant barriers in successful interprofessional collaboration (Cook, 2005). Advancing interprofessional education and interprofessional collaborative practice necessitate collaboration among educators, practitioners, researchers, policy-makers and the public.

In order to successfully advance interprofessional education, early experiences must be positive for the learner and embedded in curricula (WHO, 2010). "This will ensure continued involvement and a willingness to further develop the curriculum based on student feedback"

(WHO, 2010, p. 24). “Students who participate in IPE activities, may be more likely to enter practice with a working knowledge of the roles, scopes of practice, philosophies, and professional language used by the other disciplines, which may improve interprofessional collaboration and client care” (Howell, English, & Page, 2011, p. 6). Research should focus on students’ perspective of interprofessional education and learning. As suggested by Howell et al. (2011), “Teaching, interprofessional collaboration within clinical training experiences may allow students real-life opportunities to identify barriers, problem-solve solutions, and practice the necessary skills to work as part of an interprofessional team” (p. 2). Currently, interprofessional education and interprofessional collaborative practice are only beginning to emerge in training programs for students interested in becoming speech-language pathologists. Therefore, there is minimal research on how and when to start implementing this into an undergraduate program.

## **LITERATURE REVIEW**

During a professional education experience, students come to identify with their intended profession, values, cultures, roles, and expertise. There is often a disconnect between professions that may collaborate in a future professional setting. Students learn about their desired profession; however, they may have limited knowledge about the roles, scope of practice, philosophies, or the professional language used by other disciplines. This, in turn, may lead to significant barriers to successful interprofessional education (Howell, English, & Page, 2011). Interprofessional education has been promoted as the catalyst that will provide the development and promotion of a better understanding of other professions (IPEC, 2011). “The delivery system cannot make that shift effectively until the education system begins to train new health professionals in collaborative practice” (IPEC, 2011, p. 9). This research project is designed to investigate how interprofessional education can be incorporated into the curriculum. This chapter addresses relevant research related to the topic of interprofessional education and strategies to design, implement, and evaluate interprofessional education. The literature reviewed the (1) Interprofessional Education across Medical Disciplines, (2) Interprofessional Education Curriculum: Strategies, (3) Cross-Disciplinary Experiences in Interprofessional Education, (4) Designing, Implementing, and Evaluating Simulations in Interprofessional Education.

### **Interprofessional Education across Medical Disciplines**

Interprofessional education and interprofessional collaborative practice are not unique. It is a concept that has been advocated for more than 40 years by the Institute of Medicine (IOM; Institute of Medicine of the National Academies, 2001). Interprofessional education, believed to be a catalyst for successful interprofessional clinical practice, is promoted by agencies

worldwide (D'amour & Oandasan, 2005). The American Speech-Language-Hearing Association has recently started a push to formulate a plan on how to better equip future clinicians and on how to begin to train future clinicians within this conceptual framework of interprofessional education to match the increasing demand for interprofessional collaboration. In response, this topic has become an interest to faculty who are teaching in the area of speech-language pathology. The research is limited on how to train future clinicians effectively within this concept; however, there are extensive models that include other disciplines, such as physicians and nurses. Zraick, Harten, and Hagstrom (2014) report that in 2011, a health organization group known as the Interprofessional Education Collaborative (IPEC) identified a set of core competencies for professional practice. These core competencies define the knowledge and skills needed to practice interprofessionally; however, the groups represented included nursing, medicine, pharmacy, and public health. Among the notable absences from this list were occupational therapy, physical therapy, and speech therapy (Zraick et al., 2014). In the most recent updated report by IPEC, these professions are included,

The report is inspired by the vision that interprofessional collaborative practice is key to the safe, high-quality, accessible, patient-centered care desired by all. Achieving that vision requires the continuous development of interprofessional competency by health professions students and students in other professional fields as part of the learning process so that they enter the workforce ready for a collaborative practice that helps to ensure health (IPEC, 2011, p. 4).

The core competencies as defined by the Interprofessional Education Collaborative Expert Panel are: (1) values and ethics for interprofessional practice - work with individuals of other professions to maintain a climate of mutual respect and shared value; (2) roles and responsibilities,

use of knowledge of one's role and those of other professionals to appropriately address the health care needs of patients and to promote and advance the health of population; (3) interprofessional communication - communicate with patients, families, communities, and professionals in health and other fields in a responsive and responsible manner that supports a team approach to the promotion and maintenance of health and the prevention and treatment of disease; (4) teams and teamwork - the ability to apply relationship-building values and the principles of team dynamics to perform effectively in different team roles to plan, deliver, and evaluate patient/population-centered care and population health programs and policies that are safe, timely, effective and equitable. As a result, the American Speech, Language, and Hearing Association has established a *Strategic Pathway to Excellence* plan comprising eight strategic outcomes. Strategic Objective #2 is to advance Interprofessional Education and Interprofessional Collaborative Practice. The desired outcome of this objective is that by 2025, academic programs are using IPE approaches in interprofessional collaborative practice (Zraick et al., 2014).

### **Interprofessional Education Curriculum: Strategies**

**Strategies utilized in implementing IPE.** The implementation of IPE, being new in the field of Communication Sciences and Disorders (CSD), results in knowing little about what IPE looks like for students in undergraduate and graduate CSD programs (Goodman, 2016). A few strategies for effective learning in IPE are consistently represented in the literature. Didactic learning, which includes lecture and written materials, is something every profession relies on; however, Barr (1996) recommends strategies that employ interactive methods such as case-based learning, observation-based learning, and problem-based learning. These strategies are utilized in both lecture and clinical IPE settings (Goodman, 2016).

***Cased-based learning.*** “The movement from theory to practice is frequently accompanied by embarrassments” (Shulman, 2004, p. 252). Shulman (2004, p. 252) asserts that all too frequently, those for whom the research is intended to inform ask the questions “How can the theories, so carefully crafted and empirically grounded, frequently fail to hold up against even the most gentle winds of practical exigency? What is the contribution of scholarly theory to the enhancement of practice?” The traditional stance for those who wished to influence practice was to research in a laboratory, to formulate theories based on well-controlled experiments. An alternative research strategy is to study accomplished practice as it occurs and to ask how it has been achieved (Shulman, 2004). This is the premise for computer-based simulations in the development of IPE as well as the foundational skills of undergraduate students focusing on speech-language pathology. Kneebone (2005) avows that quality simulated learning experiences must include deliberate practice in a safe environment, expert instructors, simulation experiences that mimic real life, and learner-centered experiences.

Shulman (2004) defines case studies as powerful tools for professional learning. Individuals must learn to move between the memorable particularities of cases and the robust generalizations and simplification of principles and theories. Cases provide excellent opportunities for the learner to “criss-cross the landscape” of theory and practice (Sprio, Coulson, Feltovich, & Anderson, 1988 as cited in Shulman, 2004). Reflection on one's practice plays an intricate role in developing a skill set in the education and medical setting. It is a critical component of evidence-based practice and allows a novice to become a well-rounded professional. Shulman (2004) argues that the essence of any case is chance, and a case becomes educative when it combines four functions or components: intention, chance, judgment, and reflection. When one is learning from a case, one is not learning from the experience but is



learning by thinking about the experience. “The process of remembering, retelling, reliving, and reflecting is the process of learning from experience” (Shulman, 2004, p. 474).

Shulman (2004) avows that education is built upon the process of remembering, retelling, reliving, and reflecting upon the experience. Utilizing a case of subject matter pedagogy allows a student to learn from experience. Shulman (2004) states that if a student is to learn from experience – whether their own or vicariously through the case-based experiences of others – they must learn to parse the flow of experience into the structure of cases. They must learn a syntax, a grammar of cases, which provides a set of terms within which they can organize and analyze their understanding of experience. Simulation learning experiences are constructivist in nature. Diekmann, Gaba, and Rall (2007) define this as social practice in which participants interact with one another in a goal-orientated fashion. Learners construct new knowledge based on their experiences and active engagement in the learning process. Learning experiences are occasions in which errors must be made. “They will be forgiven only if they can be remembered, reflected upon and become a source of learning. ‘Forgive and forget’ is a motto for good relationships without growth. ‘Forgive and remember’ is a slogan for all practical learning experiences and an inspiration for those who would learn from cases” (Shulman, 2004, p. 469).

***Simulation.*** Frequent discussion of computer-based interactive simulations occurs in the IPE literature. "Simulation is a generic term that refers to the artificial representation of a real-world process to achieve educational goals via experiential learning" (Flanagan, Nestel, & Joseph, 2004, p. 57). Simulation provides learning opportunities for students to gain valuable exposure to patient situations that do not disrupt the standard delivery of care. It allows for repeated practice and formative exposure to conditions not yet experienced. Through simulated activities, students gain permission to practice skills in a safe environment and with the

allowance of mistakes to occur as learning opportunities. Simulations can occur in five categories, ranging in levels of fidelity: standardized patients, part-task trainers, mannequins, computer-based interactive, and immersive virtual reality. Dudding and Nottingham (2018) define each of the types of simulations as follows; (1) standardized patients - a person who simulates an actual patient in a realistic, standardized, and repeatable way; (2) Task trainers are a device to train in a specific procedure or skill. The trainer represents a part or region of a body, which can be used in combination with other types of simulations; (3) Mannequins are life-size human-like simulators controlled by computers and software. The mannequins can vary in fidelity, as well as cost. High-fidelity simulators include heart, lung, movement, hearing, and voice functioning; (4) Computer-based interactive simulations are represented on a computer screen, often based on interactive gaming technologies; (5) Immersive virtual reality is a computer-based three-dimensional representation that has the feeling of immersion.

Constructing a quality simulated learning experience is more complicated than just utilizing technology to teach a concept. These experiences must also be grounded in learning theory and educational philosophy. “Simulation-enhanced IPE (SIM-IPE) provides teams of students from multiple professions the opportunity to address relevant cases in a supportive context” (Brown, Estis, Szymanski, & Zraick, 2018, p. 42). A clear focus on areas of practice or disorders served by the professions involved yields meaningful student interactions (Brown, Estis, Szymanski, & Zraick, 2018). SIM-IPE has been defined as “when participants and facilitators from two or more professionals engage in a simulated health care experience to achieve shared or linked objectives and outcomes” (Decker et al., 2015, p. 294). “In a simulation-based IPE experience, students receive direction and feedback while developing clinical skills in a low-risk environment. During post-simulation debriefing interprofessional

teams reflect and critique team interactions, individual performance, and patient care” (Brown, Estis, Szymanski, & Zraick, 2018, p. 42).

### **Cross-Disciplinary Experiences in Interprofessional Education**

Students entering programs for different professions in the same college may have limited knowledge about the roles, scopes of practice, philosophies, or even professional language used by other disciplines, which consequently may lead to significant barriers to successful interprofessional collaboration (Howell, English, & Page, 2011). Howell et al. (2011) assert that opportunities for students to engage in interprofessional teamwork during coursework would ideally result in improved interprofessional clinical practice. However, a survey of working physical and occupational therapists found that when asked where interprofessional education should occur, 65% of these respondents suggested clinical placement over the classroom (Mueller, Klingler, Paterson, & Chapman, 2008). This may allow students to gain experience with real-life opportunities. However, many barriers exist such as scheduling students at similar times from different academic programs. “If education is part of the problem, it must also be part of the solution” (Barr, Koppel, Reeves, Hammick, & Freeth, 2005, p. 8).

### **Designing, Implementing and Evaluating Simulations in Interprofessional Education**

***Design.*** Designing, implementing, and evaluating simulations need to be student-centered, with opportunities for active learning and collaboration. The design should focus on pre-established learning objectives as well as involve the development of clinical decision-making and the acquisition of knowledge and skills. Evaluation should include an assessment of student performance and simulation experiences.

***Implementing.*** Implementation of the simulated learning experience consists of three phases: pre-briefing, simulation scenario, and debriefing. Pre-briefing includes orientation to the

simulated learning experience. The expectation of performance, learning objectives, and evaluation measures are discussed. The learners then participate in the scenario (Dieckmann, Gaba, & Rall, 2007; Gaba, 2004; Jeffries, 2005). Debriefing is the most critical learning experience of the simulation process as it is the key to learner assimilation of knowledge and skill, and transfer of learning to the future situation (Jeffries et al., 2015). Debriefing occurs immediately following the simulation experience and is led by an experienced facilitator. Participants receive feedback and are encouraged to engage in reflective thinking. This provides an opportunity to practice and acquire knowledge and skills in a safe environment.

***Evaluating.*** However, there are many barriers in the management, planning, and implementation of IPE (Goodman, 2016). Goodman reported challenges related to the alignment of clinical placement timetables to enable a range of professions to participate, a lack of a unified focus by participating disciplines on developing curricula, and a lack of involvement of critical partners in the development, planning, and implementation of IPE activities. The author suggested that "programs needing guidance in developing interprofessional curriculum could consider utilizing action research approach to improve the content, design, and implementation of their IPE initiatives" (Goodman, 2016, p. 117). A systems-based approach called the Plan-Do-Study-Act is one way in which to implement action research as a way to pursue continuous improvement (Langley, Nolan, Norman, & Provost, 2009). See Figure 1.

Figure 1 . Action Based Approach to Developing IPE Curriculum

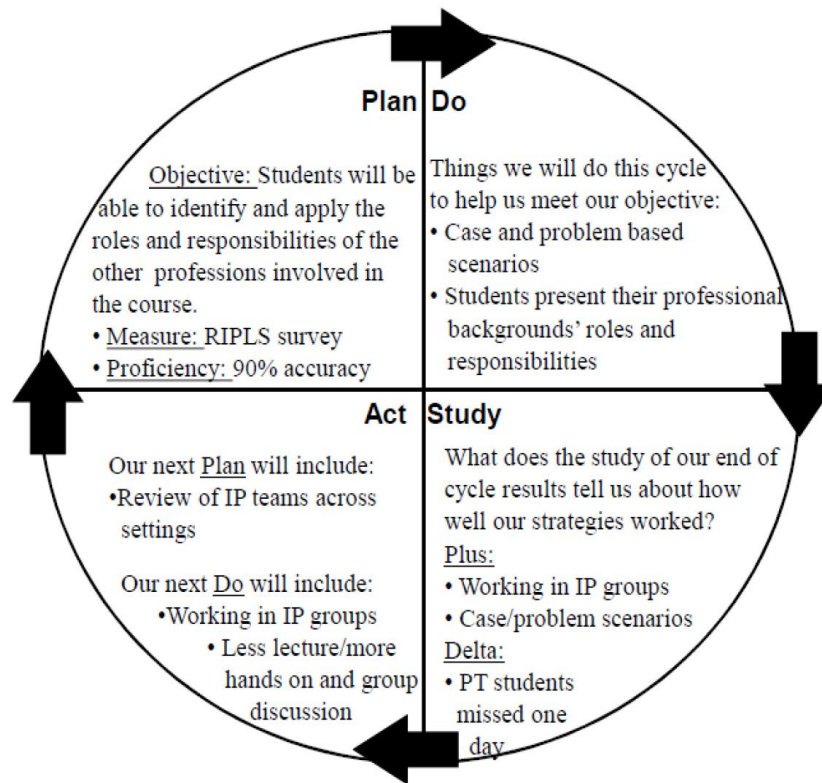


Figure 1. This PDSA cycle illustrates the use of action research in the continuous improvement of the IPE curriculum. Adapted from Langley et al., 2009 (as cited in Goodman, 2016). Reprinted from *Interprofessional Education in Undergraduate & Graduate Communication Science Disorders Programs: A National Exploratory Investigation* (p. 118), by M.C. Goodman, 2016, Ann Arbor, MI: ProQuest. Copyright 2016 by Meaghan Goodman. Reprinted with permission.

## **RATIONALE & RESEARCH QUESTIONS**

Notably, there is literature that reports how interprofessional education is being incorporated into the curricula in other disciplines, however, for CSD programs wanting to become involved in IPE there is a limited direction as to what curriculum and activities look like, how is it being implemented, what outcomes are being measured, and how evaluation is incorporated. There is limited information on barriers related to interprofessional education and how those barriers should be overcome. Information such as this would be of benefit to the field and assist in directing educators on how to take an interprofessional educational approach as well as when IPE should be incorporated into the curricula.

The purpose of this study is to explore the use of an interprofessional, evidence-based learning experience for students in the Speech, Language, and Hearing Sciences program. The study will utilize a computer-based interactive simulation (SimuCase) to meet the following objectives:

- Develop a learning environment that enhances and enables interprofessional education.
- Highlight the exclusive contributions of each profession and the areas of shared decision-making in the provision of evidence-based health care.
- Expand respect and knowledge of roles, contributions, and expertise of various health care professionals in the delivery of health care services to clients.
- Increase clinical skills to identify the essential information within a given case.
- Cultivate knowledge and understanding of the importance of interprofessional collaboration and communication.

The study will answer the following research questions:

- 1) What do undergraduate students involved in computer-based simulation learning experiences believe to be the definition, goal, and value of effective Interprofessional Education?
- 2) How do students perceive the computer-based simulated?

## **METHODS**

In this chapter, the methodological framework for the research project is outlined, including the participants, materials and setting, procedures, and the research design. Two clearly defined questions will serve as the basis for this research. The research will investigate students who engaged in interprofessional education while collaborating with students from various disciplines to create a plan of treatment for a computer-based simulated client. Mixed-methods were employed to investigate the research problem. The researcher utilized the Grounded Theory to study the students' answers to the open-ended survey question. The main goal in developing new theories from Grounded Theory "is the purposeful, systematic generation from the data of social research" (Glasser & Strauss, 1967, p. 28). This qualitative approach allowed the researcher to fully develop the students' answers to open-ended questions.

The Simulation Effectiveness Tool – Modified (SET-M) was used to assess the students' perception of the effectiveness of learning in the simulation environment. Descriptive statistics were used to summarize student perceptions of how practical the simulation experience had been.

### **Participants**

Participants in this study were undergraduate students at a state university in the Mid-western United States, who are enrolled in courses focused on speech-language pathology, nursing, and behavior analysis. The learning sessions were implemented two times with 12 participants (7 participants in the first session and 5 participants in the second). The seven students in the first session were a combination of four third- and fourth-year speech, language and hearing sciences students and three third-year nursing students. The second session was



composed of four first- and second-year speech, language, and hearing sciences students and one second-year behavior analysis student. Due to unanticipated scheduling conflicts education and social work, students were not represented in this study. The researcher served as the facilitator for the learning sessions. Participation was voluntary and students choosing not to participate did not have any negative consequences.

### **Materials and Setting**

The materials utilized included a membership to SimuCase, a laptop, and SET-M (See Appendix A), and open-ended questions (See Appendix B). The classroom was an interactive classroom with tables that were grouped to create an interactive learning environment. The facilitator utilized the faculty guide (See Appendix C) during the learning session. The faculty guide included logistical details, learning objectives, required materials, and room setup, as well as a detailed timeline of the session. The faculty guide additionally included a case overview. Each area was broken down, with a summary of the content. Discussion questions and learning goals followed this.

### **Procedures**

The material created for the Interprofessional Learning Session was designed to explore undergraduate students' perception of IPE, and the impact of the computer-based simulation has on IPE. The SimuCase virtual patient utilized was "Doug." This virtual patient highlighted the complexities inherent in patient-centered care while emphasizing the importance of understanding roles and values across professions, as is critical for learners early in their education within their chosen career. The learning session included interprofessional learning activities, which included a brief overview of IPE definitions, rationale, and the IPEC Core Competencies (Interprofessional Education Collaborative Expert Panel, 2011).

The case involved a high school student (Doug) who sustained a severe traumatic brain injury when he was struck in the head by a baseball. In this simulation, Doug is beginning his transition from the rehabilitation setting to the school setting. He was referred by the school guidance counselor to the school speech-language pathologist to assist with a successful transition to the school setting. As a result of his brain injury, Doug exhibits substantial cognitive, physical, and communication deficits. Before his injury, Doug was reported to excel in all academic areas. This case highlighted the need for multiple professionals to collaborate in order to create a successful plan of care, the importance of communication across providers, as well as the need for patient and family-centered care.

Participants were provided with case notes in advance of the session. The session began with a presentation, which focused on an introduction to IPE, a brief overview of the learning session, and reflection upon and sharing roles/responsibilities and training of health professions. Next, the researcher introduced the case, reviewed the use of the online virtual software (SimuCase), and reviewed the case notes with the participants. The researcher then guided the participants by facilitating interaction and promoting reflection. The students generated an interprofessional examination of the client, focusing on identifying the essential information in the case and the interprofessional collaborators. They worked together to evaluate the findings and to develop an interprofessional plan of care. The groups then convened in the larger room, and the researcher led the debriefing. First, the case was debriefed, asking questions such as: “What were the strengths and challenges working as a team where each member has a unique role and responsibilities when collaborating on a complex patient-centered care plan?” Second, the entire session was debriefed, asking questions such as: “Overall, what did you like about the learning session today? What went well? Overall, what would you have wished was different?”

What do you feel like you need or would like to develop competency in coordinator care, teamwork, or collaborative practice?" The debrief session was summarized.

### **Data Collection**

This research study was formatted to engage the knowledge and skills of an interprofessional team of undergraduate students such that they relied on each other in order to enhance their understanding of the computer-based simulation of a patient scenario. An anonymous link was sent to the student participants via the *Qualtrics Survey Software*, at the end of the learning session. The post-survey included the Simulation Effectiveness Tool - Modified (SET-M) (Appendix A). All participants completed the SET-M, a 19 item scale assessing students' perception of the effectiveness of learning in the simulation environment. Using a three-point Likert Scale (3=strongly agree; 1=do not agree), students indicated responses to statements such as "Prebriefing increased my confidence," "I felt empowered to make clinical decisions," and "Debriefing contributed to my learning." The SET-M was selected based on its relevance as a post measure of students' perception of the effectiveness, and evidence of reliability and construct validity. Multiple other authors have reported on SET-M reliability, validity, and normative data (Leighton, Ravert, Mudra, & Macintosh, 2015).

In addition to the SET-M, The participants answered four open-ended survey questions (Appendix B). The questions focused on the value of IPE, the purpose or goal of IPE, and the benefits of IPE and collaborative practice. Students were asked to describe their experience utilizing the computer-based simulation activities and the effectiveness of increasing their ability to identify essential information and potential collaborators on a given case.

## Data Analysis

The mixed methods design of the study allowed the researcher to use both the quantitative and qualitative data to answer the two research questions: (1) What do undergraduate students involved in computer-based simulation learning experiences believe to be the definition, goal, and value of effective Interprofessional Education? (2) How do students perceive the computer-based simulated IPE?

Quantitative and qualitative data were analyzed by the use of the report that was generated by the *Qualtrics Survey Software*. The researcher used the systematic design approach for Grounded Theory to analyze data. Corbin and Strauss (2014) affirm, “The procedures [found in Grounded Theory] can be used to uncover beliefs and meanings that underlie action, to examine rational as well as nonrational aspects of behavior, and to demonstrate how logic and emotion combine to influence how persons respond to events or handle problems through action and interaction” (p. 11).

The researcher utilized coding and Grounded Theory together to generate questions, fracture data and develop relationships or categories to integrate into the conceptualized analysis (Strauss, 1987, Glaser, 1978). Coding enabled the researcher to discover categories based on the themes that appeared throughout the initial analysis. The initial phase of analysis is known as open coding. During this phase, the researcher “forms initial categories of information about the phenomenon being studied by segmenting information” (Creswell, 2012, p. 424). In the second phase, the researcher broke down the data to compare and group data into categories based on similarities from the first phase of coding; this phase is known as axial coding. Next, the researcher created a coding paradigm, which portrayed the interrelationship of causal conditions, strategies, contextual and intervening conditions, and consequences (Creswell, 2012).

For the quantitative data, each individual item on the SET-M was analyzed. The researcher used *Qualtrics* to produce means for the 19-item scale assessing students' perception of the effectiveness of learning in the simulation environment. Using a three-point Likert Scale (3=strongly agree; 1=do not agree), students indicated responses to statements such as "Prebriefing increased my confidence," "I felt empowered to make clinical decisions," and "Debriefing contributed to my learning." Descriptive statistics were calculated, including the following: values, mean, and standard deviation. Means were at the highest value of the scale for all items. Participants responded to all items, and there were no missing values.

Triangulation is the process of collecting data from multiple sources with different methods of collection and developing themes (Creswell, 2012). The validation of data through triangulation occurred by cross verifying the qualitative responses with the results of the closed-ended survey results. Furthermore, to gain knowledge related to the participants and further validate the results of the quantitative and qualitative study, the participants responded to scaled questions regarding their self-perception and attitude toward teamwork, patient-centered care, and interprofessional collaborative practice.

## RESULTS

In this study, the researcher used a mixed methods design to investigate students' perceptions of the effectiveness of Interprofessional Education in the simulation environment. Participants provided responses that led to the creation of codes, categories, and themes. Several themes began to emerge regarding the participants' perception and understanding of interprofessional education and collaborative practice, as well as the perception of the impact the simulated case on the interprofessional education environment. Four themes emerged related to the core competencies of interprofessional education: *the positive perceived value of interprofessional education and collaborative practice; communication; teamwork; and patient-centered care*. The two common themes related to interprofessional education in the simulation environment were *opportunities for practice in a collaborative setting* and *pre-professional opportunities for practice and reflection*.

To answer the research question, *What do undergraduate students involved in computer-based simulation learning experiences believe to be the definition, goal, and value of effective Interprofessional Education?* participants answered open-ended questions. All participants (n=12), responded. *Table 1* summarizes the questions used to prompt the students' responses.

**TABLE 1: *Interprofessional Education and Collaborative Practice Questions***  
**SURVEY OPEN-ENDED QUESTIONS**

1	Do you see any value in IPE? Why or why not?
2	What do you see as the purpose or goal of Interprofessional Education (IPE)?
3	What benefits have you found from learning about interprofessional education and interprofessional collaborative practice?

The participants' responses aligned with the identified core competencies. The majority of the participants' comments (n=7) reflected a positive perceived value of interprofessional education, followed by the perceived value of patient-centered care (n=6), and followed by a

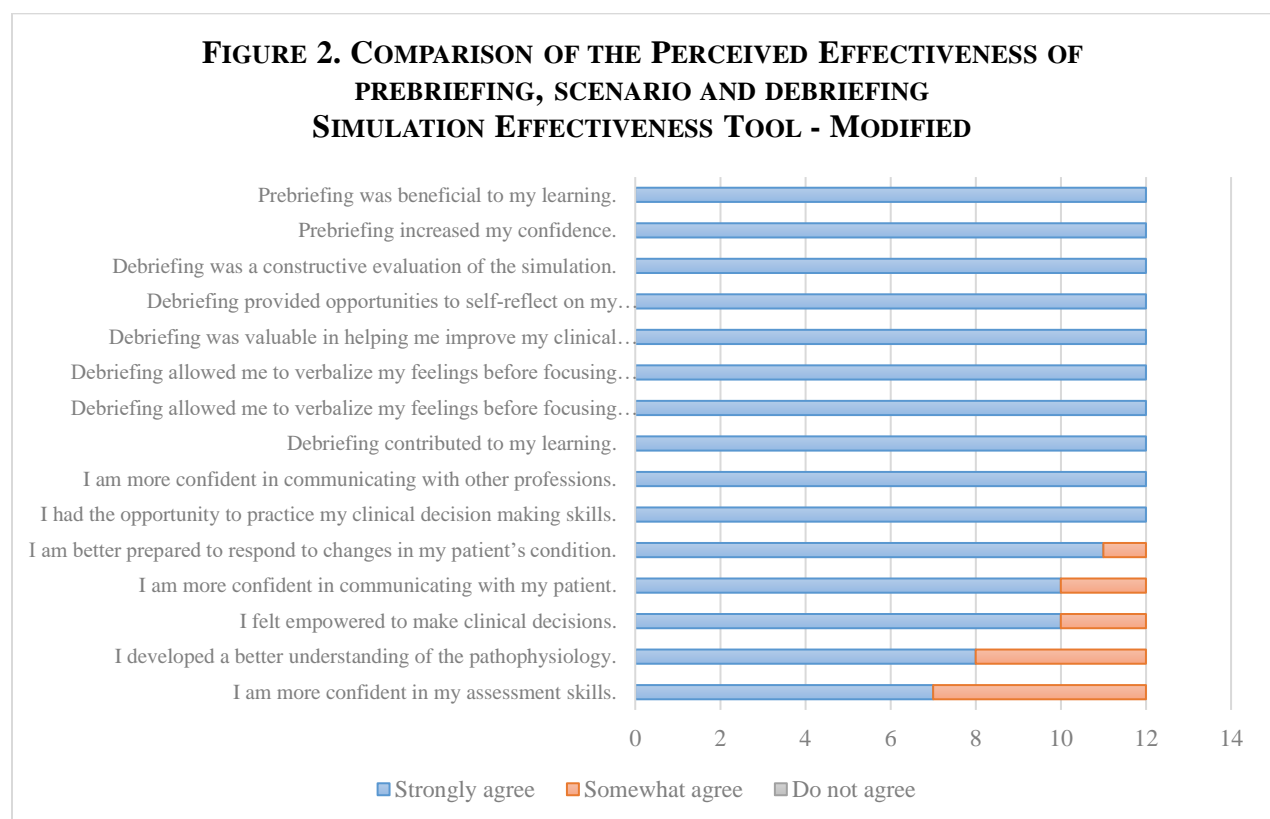
better understanding of teamwork and collaboration (n=5). Fewer comments were reflective of the role of communication in collaborative care (n=2). Table 2 lists the categories and illustrative quotes.

**TABLE 2: CATEGORIES AND ILLUSTRATIVE QUOTES AS RELATED TO THE IPEC CORE COMPETENCIES**

	<b>POSITIVE PERCEIVED VALUE OF INTERPROFESSIONAL EDUCATION AND COLLABORATIVE PRACTICE.</b>
<ul style="list-style-type: none"> <li>• <i>Values/Ethics for IPE</i></li> </ul>	<ul style="list-style-type: none"> <li>• <i>The purpose of IPE is to effectively come together as professionals in different areas of knowledge to best impact the patient/individual.</i></li> <li>• <i>I absolutely see value in IPE. It is critical to have an understanding of the other professions that work alongside your own and how they interact with one another.</i></li> <li>• <i>I think it very important because there are always so many different aspects to look at, and it is important to get other opinions on the matter.</i></li> <li>• <i>It lets professionals focus on their expertise and allow other professionals to help the client better.</i></li> <li>• <i>If we all are going to be working together, it is important to have knowledge of each other's professions and be comfortable collaborating to provide the best possible care to the patient.</i></li> <li>• <i>Yes, there is value in other's perspectives and building upon everyone's individual knowledge to effectively treat clients.</i></li> <li>• <i>Absolutely, one value is learning more about other professions that enhances my education.</i></li> </ul>
	<b>PATIENT-CENTERED CARE</b>
<ul style="list-style-type: none"> <li>• <i>Roles/Responsibilities</i></li> </ul>	<ul style="list-style-type: none"> <li>• <i>Being able to provide patients with care that helps them</i></li> <li>• <i>Providing a complete, personalized treatment plan using an IPE team to give them the best experience.</i></li> <li>• <i>To promote patient center care</i></li> <li>• <i>to enrich patient care</i></li> <li>• <i>To benefit all aspects of a client's care.</i></li> <li>• <i>There is value in IPE because it allows for the professions to work together to give the patient the best care possible</i></li> </ul>
	<b>TEAMWORK/COLLABORATION</b>
<ul style="list-style-type: none"> <li>• <i>Teams &amp; Teamwork</i></li> </ul>	<ul style="list-style-type: none"> <li>• <i>Being able to work with other professions to help the patient return to as normal of a life as possible</i></li> <li>• <i>I see that Inter-professional Education allows students in different degrees to collaborate and understand how they fit into each other's professions in the future.</i></li> <li>• <i>Learning how to collaboratively care for a patient appropriately among different professions.</i></li> <li>• <i>Successfully working as a team and using knowledge from people with different expertise to best treat clients.</i></li> <li>• <i>To collaborate well with other professions and learn from each other</i></li> </ul>
	<b>ROLE OF COMMUNICATION IN COLLABORATIVE CARE</b>
<ul style="list-style-type: none"> <li>• <i>Interprofessional Communication</i></li> </ul>	<ul style="list-style-type: none"> <li>• <i>I see the value in this is I can gain perspectives on how I will have to communicate in my future field.</i></li> </ul>

To answer the research question, *How do students perceive the computer-based simulated IPE?* The researcher analyzed the individual items on the SET-M. The researcher used *Qualtrics*

to analyze the frequencies for the 19-item scale assessing students' perception of the computer-based simulated IPE environment. *Figure 2* presents the frequencies for each item. Of the 19 items, 52% were rated as “strongly agree” by all participants. Those items rated at the highest value were related to the components of prebriefing, debriefing, and communicating with other professionals as well as professional practice. The items with the fewest “strongly agree” responses were related to the participants personal understanding of the content of the case study and their confidence in applying it. The final items that did not receive 100% “strongly agree” responses were related to communicating with the patient and making clinical decisions related to the case study.



The researcher employed data triangulation to validate the closed-ended survey results further. Triangulation is the process of corroborating evidence from different types of data or methods of data collection (Creswell, 2012). The validation of data through triangulation



occurred by cross verifying the qualitative responses with the results of the closed-ended survey results.

Implementation of the simulated learning experience yielded participant responses that indicated that students appreciated the opportunity to learn from other students in the simulated IPE environment. Additionally, participants recognized the value of experiencing situations at an earlier stage that can help an individual learn and gain skills that they otherwise may not have obtained until a later time. One participant expressed the fact that computer simulations allow you to make mistakes and learn from them before engaging with a real person. The participants' responses were coded into several categories that align with the themes of prebriefing, performance, and debriefing/reflection. The relationships found among the survey codes informed the category creation. Table 3 lists the categories and illustrative quotes.

**TABLE 3: CATEGORIES AND ILLUSTRATIVE QUOTES RELATED TO SIM-IPE**

<b>OPPORTUNITIES FOR PRACTICE IN A COLLABORATIVE SETTING</b>	
<ul style="list-style-type: none"> <li>• <i>Prebriefing</i></li> </ul>	<ul style="list-style-type: none"> <li>• <i>Yes, I think they are helpful in practicing working and collaborating with others.</i></li> <li>• <i>I do see a value in computer-based simulation clinical experiences. I believe they give you the opportunity to evaluate and experience situations at an earlier stage that can help an individual learn and gain skills that they otherwise may not have obtained until a later time.</i></li> </ul>
<b>PRE-PROFESSIONAL OPPORTUNITIES FOR PRACTICE</b>	
<ul style="list-style-type: none"> <li>• <i>Practice/Performance</i></li> </ul>	<ul style="list-style-type: none"> <li>• <i>I do see the value because it allows undergrad students to have experience asking patients and other healthcare providers questions without having to be face to face with them.</i></li> <li>• <i>Yes, it gives me an example of a case I may work on in the future</i></li> <li>• <i>I see value in this because it allows us to practice in realistic situations before real-life settings.</i></li> <li>• <i>Yes, it helps practice clinical experiences without any negative impacts to real clients.</i></li> </ul>
<b>DEBRIEFING AND REFLECTION</b>	
<ul style="list-style-type: none"> <li>• <i>Debriefing</i></li> </ul>	<ul style="list-style-type: none"> <li>• <i>I enjoy computer simulations because it gives you the opportunity to make mistakes and learn from them for the real world.</i></li> <li>• <i>Yes, it gives you experience before you have to work with real people</i></li> <li>• <i>Yes, it allows you to see how your mistakes can affect client care but also gives good practice in general.</i></li> </ul>

Table 4 summarizes the results regarding their self-perception and attitude toward teamwork, patient-centered care, and interprofessional collaborative practice. The set of

questions that required participants to respond to statements utilizing a scale with two defined anchors (no knowledge=1 and expert=7), and the other scaled question had two defined anchors (not at all=1 and highly preferred=7). Notably, the participants had moderate rating for all items, with the highest ratings given for working in groups (mean = 5.58). Results also indicated that their perception of their knowledge of interprofessional collaborative practice needed more growth (mean = 4.73). Finally, results showed that their knowledge of patient-centered care needed to be further developed (mean = 5.18). Due to the fact that participants did not respond to these items prior to the start of the study, it is unknown if the results of these findings indicate that students' attitudes and perceptions shifted as a result of the simulation session. It makes intuitive sense that students may need further exposure to interprofessional education in order for the individual to internalize these perceptions and attitudes in order to translate them into professional practices.

**TABLE 4: RESULTS OF SELF-PERCEPTION & ATTITUDE SCALE**

	Mean	Std Deviation
<b>Perceptions regarding your own knowledge of person-centered care.</b>	5.18	1.03
<b>Perceptions regarding your own knowledge of interprofessional collaborative practice.</b>	4.73	0.96
<b>How much do you like to work in groups?</b>	5.58	1.11

## SUMMARY AND CONCLUSIONS

The questions addressed in this study were: (1) What do undergraduate students involved in computer-based simulation learning experiences believe to be the definition, goal, and value of effective Interprofessional Education? (2) How do students perceive the computer-based simulated IPE? This research study used a mixed methods design with undergraduate students who participated in a computer-based simulated interprofessional education experience. Following this experience, participants completed a survey. The survey of the study allowed the researcher to use both the data collection and analysis procedure to answer the two research questions. The survey generated data representative of the voice of participants that will positively affect student learning in interprofessional education.

In 2011, a group of health organizations known as the Interprofessional Education Collaborative identified a set of core competencies for professional practice (IPEC, 2011). These core competencies have been used to define the knowledge and skills needed to practice interprofessionally. The first domain is values and ethics; this is defined as “work with individuals of other professions to maintain a climate of mutual respect and shared values” (IPEC, 2011, p. 19). The second domain is roles and responsibilities, which is defined as “use of the knowledge of one’s own role and those of other professions to appropriately assess and address the health care needs of patients and populations served (IPEC, 2011, p. 21). The third domain interprofessional communication, defined as “communicate with patients, families, communities, and other health professionals in a responsive and responsible manner that supports a team approach to the maintenance of health and treatment of disease (IPEC, 2011, p. 23). The final domain teams and teamwork is defined as “apply relationship-building values and

the principles of team dynamics to perform effectively in different team roles to plan and deliver patient-/population-centered care that is safe, timely, efficient, effective, and equitable” (IPEC, 2011, p. 25). Four themes emerged related to the core competencies of interprofessional education; the themes include the *positive perceived value of interprofessional education and collaborative practice, communication, teamwork, and patient-centered care*.

“Interprofessional education helps each profession to improve its own practice and to understand how that is complemented by the practice of other professions” (Barr, Koppel, Reeves, Hammick, & Freeth, 2005, p. 38). Through this experiential learning session, participants from two or more professions were able to gain a perceived value of IPE and understand one of the key principles which is learning about, from, and with students who are pursuing different professions. One participant stated, *“If we are going to be working together, it is important to have knowledge on each other professions and be comfortable collaborating with each other to provide the best possible care to the patient”* (participant illustrative quote). Furthermore, this quote illustrates the fact that interprofessional education respects the integrity and reinforces that each profession contributes more effectively to the whole. “Interprofessional education does not threaten the identity and territory of the participant professions. It values the distinctive contribution which each brings to learning and practice, and treats all participants as equals” (Barr, Koppel, Reeves, Hammick, & Freeth, 2005, p. 38).

Through the use of the computer-based simulated IPE, two common themes emerged: *opportunities for practice in a collaborative setting, pre-professional opportunities for practice, and reflection*. Constructing a quality simulated learning experience is more complicated than just utilizing technology to teach a concept. These experiences must also be grounded in learning theory and educational philosophy. “Simulation-enhanced IPE (SIM-IPE) provides teams of

students from multiple professions the opportunity to address relevant cases in a supportive context” (Brown, Estis, Szymanski, & Zraick, 2018, p. 42). A clear focus on areas of practice or disorders served by the professions involved yields meaningful student interactions (Brown, Estis, Szymanski, & Zraick, 2018). SIM-IPE has been defined as “when participants and facilitators from two or more professionals engage in a simulated health care experience to achieve shared or linked objectives and outcomes” (Decker et al., 2015, p. 294). “In a simulation-based IPE experience, students receive direction and feedback while developing clinical skills in a low-risk environment. During post-simulation debriefing interprofessional teams reflect and critique team interactions, individual performance, and patient care” (Brown, Estis, Szymanski, & Zraick, 2018, p. 42).

### **Limitations**

Variables were present in this study. For example, the SET-M is a tool that is used for simulations completed in nursing programs and was modified to fit the needs of this study. Therefore, it is unknown how the validity and reliability of the tool were affected by this modification. Despite the positive response from the participants involved in the study, there is no way to know if the positive results can be associated with the learning environment. In future studies, the researcher should record the learning sessions as to capture discussion that occurred throughout the interprofessional learning experience. This discussion could be coded and inform further category creation as well as capture aspects of the learning session that may be missed in closed-ended and open-ended survey questions.

In addition, due to unanticipated scheduling conflicts education and social work students were not represented in this study. As a result, the interprofessionalism of the participant teams was not as robust as anticipated. Additionally, the recruitment of participants was an unforeseen

barrier to this research study; therefore, the sample size was limited to 12 total participants. Consequently, generalizability is not evident. Scriven (2006) asserts that generalizability is the most important when attempting to determine significance. When reviewing a research study, one should be able to answer the questions: Can the program be used with similar results if we use it with other content, at other sites, with other staff, on a larger or smaller scale, with other recipients, in other climates?

Furthermore, a limitation of the study may be that the current author/researcher was fully engaged in the learning session. The researcher knows a majority of the participants who took part in the study because of engaging with the participants in other classes as the instructor for that class; therefore, a relationship prior to participating in this study was formed.

Despite these limitations that could have affected the outcome, the quantitative and qualitative data show evidence of positive perception and understanding of interprofessional education, the use of computer-based simulations in a learning environment, and a desire to work in a collaborative setting. Future studies should continue to refine the model and methods used to implement interprofessional education in a simulated environment. The most beneficial aspect could come from increased integration of IPE into the undergraduate curriculum

## **Discussion**

The case, ‘Doug’ that was utilized highlighted the need for multiple professionals to collaborate in order to create a successful plan of care, the importance of communication across providers, as well as the need for patient and family-centered care. The computer-based simulation made the experience come alive in a way that allowed students to understand the importance of team-based care. During the debriefing activities, to ensure meaningful learning,

the discussion was directed to uncover care priorities from the perspective of each profession represented and its alignment with the perceptions of patient priorities.

Findings from this study indicate readiness for IPE at an early stage in a student's undergraduate education as well as the effect of IPE on students' attitudes and perceptions of IPE and collaborative practice in a simulated environment. In order to focus on the knowledge and skills needed, opportunities for preprofessional students to engage in, and practice the IPE core competencies identified by IPEC, is essential. Individuals presenting with neurological impairments present a strong reason for interprofessional collaboration as both health care plans and individual education programs are labor-intensive and require effective collaboration and communication across contexts. Knowledge, mentoring, and practice working in collaborative teams are essential components in pursuing the objectives related to patient-centered care. The overlapping areas across various professions may be misunderstood resulting in the pursuing of goals and objectives to be counterproductive which may impede progress instead of strengthening. Engaging in a computer-based simulation case can provide insight into another professional's perspective with no risk to an actual patient.

Finally, this study was successful in increasing participants' IPE-related skills and values. Participants reported new knowledge of IPE, growth in their knowledge of their own, and others' professional roles and reported an understanding of the need for communication and teamwork in IPE. The results of these findings indicate that students' attitudes and perceptions may shift in a positive direction after learning sessions. Nevertheless, students need further exposure to interprofessional education in order for the conversion into a professional's practice to take place. The utilization of this early learning may be a foundation to increasing confidence and empowerment during the implementation of interprofessional collaboration; however, more

focused learning needs to take place in the programs of undergraduate students. The learning continuum and experiences necessitate a team approach that builds upon prior experiences; the focus should be one that incorporates the IPE learning trajectory by aligning learning activities with the Interprofessional Education Collaborative (IPEC) Expert Panel Core Competencies. The IPE Curricular Framework, Figure 3, can be used to inform curriculum development within programs.

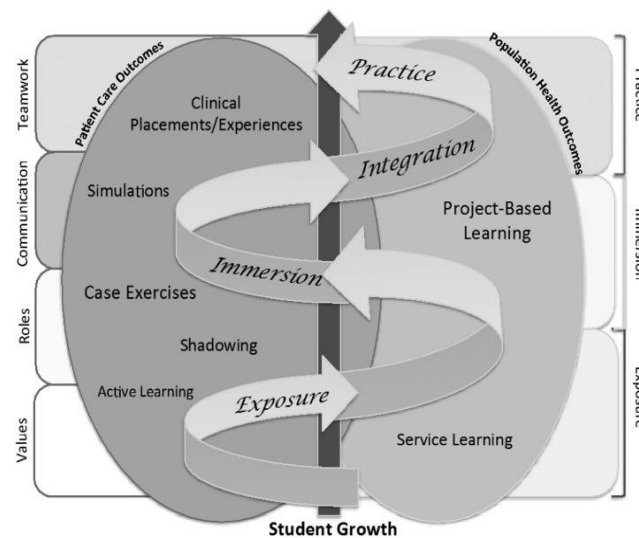


Figure 3. Interprofessional Curricular Framework (from, Danielson and Willgerodt, 2018)

For successful IPE to meet the benchmark of collaboration, a team of individuals from varying professions must engage in co-treatment in a clinical setting. Utilizing simulated IPE is one opportunity that allows for this practice to occur and for students to gain experiences working with professions other than their own without risk to an actual person. For the students' knowledge and skills to develop to a level that would allow for conversion into the professional, the IPE experiences need to be sustained over time and needs to engage a cohort of students from a variety of preprofessional programs. The approach should allow students to course through a



cycle of learning, and that allows the students to apply problem-solving and experiential learning to promote deep learning.

### **Recommendation for Future Research**

There are several areas for future research that were uncovered through this study. Notably, there is literature that reports how interprofessional education is being incorporated into the curricula in other disciplines, however, for CSD programs wanting to become involved in IPE there is a limited direction as to what curriculum and activities look like, how is it being implemented, what outcomes are being measured, and how evaluation is incorporated. First, a study should be conducted with a larger sample size of participants from a boarder range of disciplines over a more extended period. This study could be a longitudinal study in which participants engaged in interprofessional education for multiple semesters or years.

Second, a study should focus on the use of facilitators who conduct the learning sessions. It would be beneficial to gain information on how leadership skills, confidence, knowledge, and skills influence the quality and nature of the learning in a simulated interprofessional learning environment.

Finally, a research study that compares participants self-perception and attitudes related to teamwork, patient-centered care, and interprofessional collaborative practice before and after participation in the interprofessional learning experience. This could measure if their response prior to the learning experience is skewed positively or negatively as a result of the learning session. In addition, a research study that compares the use a computer based simulated case versus a case that is presented in the written format. This could be used to gather information on how a simulated experience differs from a non-simulated experience as well as tease out the

importance of how the learning experience is affected by prebriefing and debriefing of the learning experience.

## REFERENCES

- American Speech-Language-Hearing Association. (2016). Interprofessional education and interprofessional practice in communication sciences and disorders: An introduction and case-based examples of implementation in education and health care settings. Retrieved from [www.asha.org/uploadedfiles/ipe-ipp-reader-ebook.pdf](http://www.asha.org/uploadedfiles/ipe-ipp-reader-ebook.pdf)
- Barr, H., Koppel, I., Reeves, S., Hammick, M., & Freeth, D. (2005). *Effective interprofessional education: Argument, assumption & evidence*. Blackwell Publishing Ltd.: Malden, MA.
- Brown, D. K., Estis, J., Szymanski, C., & Zraick, R. (2018). Best practices in healthcare simulations in communication sciences and disorders. Retrieved from <http://www.capcsd.org/wp-content/uploads/2018/05/Simulation-Guide-Published-May-18-2018.pdf>
- Cameron, A., Rennie, S., DiProspero, L., Langlois, S., Wagner, S., Potvin, M., ... Reeves, S. (2009). An introduction to teamwork: Findings from an evaluation of an interprofessional education experience for 1000 first-year health science students. *Journal of Allied Health*, 38(4), 220–226.
- Corbin, J., & Strauss, A. (2014). *Basics of qualitative research: Techniques and procedures for developing grounded theory* (4th ed.). Thousand Oaks, CA: Sage Publications.
- Creswell, J. (2012). *Educational research: Planning, conducting, and evaluation quantitative and qualitative research* (4th ed.). New York: Pearson.
- D'amour, D., & Oandasan, I. (2005). Interprofessionality as the field of interprofessional practice and interprofessional education: An emerging concept. *Journal of Interprofessional Care*, 19(sup1), 8–20. <https://doi.org/10.1080/13561820500081604>

- Danielson, J. & Willgerodt, M. (2018). Building a theoretically grounded curricular framework for successful interprofessional education. *American Journal of Pharmaceutical Education*, 82(10), 7075, 1133-1139. doi:10.5688/ajpe7075
- Decker, S. I., Anderson, M., Boese, T., Epps, C., McCarthy, J., Motola, I., ...& Scolaro, K. (2015). Standards of best practice: Simulation standard VIII: Simulation-enhanced interprofessional education (sim-IPE). *Clinical Simulation in Nursing*, 11(6), 293-297.
- Dieckmann, P., Gaba, D., & Rall, M. (2007). Deepening the theoretical foundations of patient simulation as social practice. *Simulation in Healthcare*, 2, 183-193
- Dudding, C., & Nottingham, E. (2018). A national survey of simulation use in university programs in communication sciences and disorders. *American Journal of Speech-Language Pathology*, 27(1), 71-81.
- Fanning, R.M., & Gaba, D.M. (2007) The role of debriefing in simulation-based learning. *Society for Simulation in Healthcare*, 2(2), 115-125
- Flanagan, B., Nestel, D., & Joseph, M. (2004). Making patient safety the focus: Crisis resource management in the undergraduate curriculum. *Medical Education*, 38(1), 56-66.
- Gaba, D. (2004). The future vision of simulation in health care. *Quality and Safety in Health Care*, 13(sup1), i2-i110.
- Glaser, B. & Strauss, A. (1967). *The discovery of grounded theory: Strategies for qualitative inquiry*. Chicago: Aldine.
- Goodman, M. C. (2016). *Interprofessional Education in Undergraduate & Graduate Communication Science Disorders Programs: A National Exploratory Investigation* (Ph.D.). University of Kansas, United States -- Kansas. Retrieved from <http://search.proquest.com/docview/1830471460/abstract/3DCBF3BC51DD43ABPQ/1>

- Institute of Medicine of the National Academies. (2001). *Crossing the quality chasm: A new health system for the 21st century*. Washington, DC: The National Academies Press.
- Interprofessional Education Collaborative. (2011, May). *Core competencies for interprofessional practice: Report of an expert panel*. Retrieved from <https://www.aacnnursing.org/Portals/42/AcademicNursing/CurriculumGuidelines/IPEC-Core-Competencies-2016.pdf>
- Jeffries, P. (2005). A framework for designing, implementing and evaluating simulations used as teaching strategies in nursing. *Nursing Education Perspectives*, 26(2), 96-103.
- Jeffries, P., Dreifuerst, K., Kardong-Edgren, T., Hayden, J., et al. (2015). Faculty development when initiating simulation programs: Lessons learned from the national simulation study. *Journal of Nursing Regulation*, 5(4), 17-23.
- Kneebone, J. D. (2017). Best practices in summative assessment. *Advances in physiology education*, 41(1), 110-119.
- Langley, G. L., Nolan, K. M., Nolan, T. W., Norman, C. L., & Provost, L. P. (2009). *The improvement guide: A practical approach to enhancing organization performance* (2nd Ed.). San Francisco, CA: Jossey Bass.
- McFadyen, A. K., Webster, V., Strachan, K., Figgins, E., Brown, H., & McKechnie, J. (2005). The Readiness for interprofessional learning scale: A possible more stable sub-scale model for the original version of RIPLS. *Journal of Interprofessional Care*, 19(6), 595–603. <https://doi.org/10.1080/13561820500430157>
- Mueller, D., Klingler, R., Paterson, M., & Chapman, C. (2008). Entry-Level Interprofessional Education: Perceptions of Physical and Occupational Therapists Currently Practicing in

- Ontario. *Journal of Allied Health; Washington*, 37(4), 189–195. Retrieved from <http://search.proquest.com/docview/210967219/abstract/4577B1A1F2AE4564PQ/1>
- Shields, P. M., & Rangarajan, N. (2013). *A playbook for research methods: Integrating conceptual frameworks and project management*. Stillwater, OK: New Forums Press.
- Strauss, A. L. (1987). *Qualitative analysis for social scientists*. Cambridge: University Press.
- Shulman, L. S. (2004). *The wisdom of practice: Essays on teaching, learning, and learning to teach*. San Francisco, CA: Jossey-Bass.
- World Health Organization. (2010). *Framework for action on interprofessional education & collaborative practice*. Geneva: World Health Organization.
- Zraick, R. I., Harten, A. C., & Hagstrom, F. (2014). Interprofessional education and practice: A primer for training future clinicians. *SIG 10 Perspectives on Issues in Higher Education*, 17. <https://doi.org/10.1044/aihe17.2.39>

## APPENDIX A. SIMULATION EFFECTIVENESS TOOL – MODIFIED (SET-M)

After completing a simulated clinical experience, please respond to the following statements.

<b>Prebriefing:</b>	<b>Strongly Agree</b>	<b>Somewhat Agree</b>	<b>Do Not Agree</b>
Prebriefing increased my confidence.	3	2	1
Prebriefing was beneficial to my learning.	3	2	1
<b>Scenario:</b>			
I am better prepared to respond to changes in my patient's condition.	3	2	1
I developed a better understanding of traumatic brain injury.	3	2	1
I am more confident in my assessment skills.	3	2	1
I felt empowered to make clinical decisions.	3	2	1
I had the opportunity to practice my clinical decision-making skills.	3	2	1
I am more confident in communicating with my patient.	3	2	1
<b>Debriefing:</b>			
Debriefing contributed to my learning.	3	2	1
Debriefing allowed me to verbalize my feelings before focusing on the scenario.	3	2	1
Debriefing was valuable in helping me improve my clinical judgment.	3	2	1
Debriefing provided opportunities to self-reflect on my performance during simulation.	3	2	1
Debriefing was a constructive evaluation of the simulation.	3	2	1
What else would you like to say about today's simulated experience?			

Leighton, K., Ravert, P., Mudra, V., & Macintosh, C. (2015). Update the simulation effectiveness tool: Item modifications and reevaluation of psychometric properties. *Nursing Education Perspectives*, 36(5), 317-323. <https://doi.org/10.5480/15-1671>

**Appendix B. Survey Questionnaire:**

1. What is your major?
2. What do you see as the purpose or goal of Interprofessional Education (IPE)?
3. Do you see any value in IPE? Why or why not? Please share one value of IPE.
4. Do you see value in computer-based simulation clinical experiences? Why or why not?
5. Please share any other comments on this learning opportunity.



## APPENDIX C.

Please indicate your perceptions related to the statements below by utilizing the sliding scale selecting the number 1-7 that best expresses your perception: No knowledge = 1 to expert = 7.

#	Field	No knowledge						Expert
1	Perceptions regarding your own knowledge of patient-centered care.	1	2	3	4	5	6	7
2	Perceptions regarding your own knowledge of interprofessional collaborative practice.	1	2	3	4	5	6	7

Please indicate your preference related to working in a group.

#	Field	Not at all						Highly preferred
1	How much do you like to work in groups?	1	2	3	4	5	6	7

## APPENDIX D.



### NORTHERN MICHIGAN UNIVERSITY

#### Memorandum

#### OFFICE OF GRADUATE EDUCATION AND RESEARCH

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**TO:** Heather Isaacson  
School of Education, Leadership, and Public Service

**CC:** Abby Cameron-Standerford  
School of Education, Leadership, and Public Service

**DATE:** April 2, 2019

**FROM:** Lisa Schade Eckert, Ph.D. *LSE*  
Interim Dean of Graduate Education and Research

**SUBJECT:** IRB Proposal HS19-1032  
IRB Approval Dates: 4/2/19 – 4/1/20  
Proposed Project Dates: 4/1/19 – 1/14/20  
“Assessing the Impact of Computer-based Simulations on the Interprofessional Education of Undergraduate Students”

Your proposal “Assessing the Impact of Computer-based Simulations on the Interprofessional Education of Undergraduate Students” has been approved by the NMU Institutional Review Board. Include your proposal number (HS19-1032) on all research materials and on any correspondence regarding this project.

- A. If a subject suffers an injury during research, or if there is an incident of non-compliance with IRB policies and procedures, you must take immediate action to assist the subject and notify the IRB chair ([dereande@nmu.edu](mailto:dereande@nmu.edu)) and NMU’s IRB administrator ([leckert@nmu.edu](mailto:leckert@nmu.edu)) within 48 hours. Additionally, you must complete an Unanticipated Problem or Adverse Event Form for Research Involving Human Subjects
- B. Please remember that informed consent is a process beginning with a description of the project and insurance of participant understanding. Informed consent must continue throughout the project via a dialogue between the researcher and research participant.
- C. If you find that modifications of methods or procedures are necessary, you must submit a Project Modification Form for Research Involving Human Subjects before collecting data.
- D. If you complete your project within 12 months from the date of your approval notification, you must submit a Project Completion Form for Research Involving Human Subjects. If you do not complete your project within 12 months from the date of your approval notification, you must submit a Project Renewal Form for Research Involving Human Subjects. You may apply for a one-year project renewal up to four times. Failure to submit a Project Completion Form or Project Renewal Form within 12 months from the date of your approval notification will result in a suspension of Human Subjects Research privileges for all investigators listed on the application until the form is submitted and approved.

All forms can be found at the NMU Grants and Research website:  
<http://www.nmu.edu/grantsandresearch/node/102>